MARKET GARDENS

IN

NATIVE COMMUNITIES

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ALBERTA NATIVE AFFAIRS
SEPTEMBER, 1985

EXECUTIVE SUMMARY

This study of market gardening in Native Communities was done for the Native Affairs Secretariat by RMC Resources Management Consultants (Alberta) Ltd. The goal of the project was to determine whether market gardening constitutes a viable development option for Native communities in northern Alberta.

The focus in this report is on a three acre market garden with possible expansion of the acreage when the operation is well established and successful. Starting on a small scale increases the chances of survival of the enterprise, because a three acre farm is likely to be within the managerial and economic capabilities found in Native communities in northern Alberta. With success, training, and experience, the garden can expand if the market allows this.

There are no real obstacles to growing vegetables in northern Alberta. Indeed, vegetables have been grown as far north as Inuvik N.W.T. Special methods have been developed to optimize the growth of plants in cool soils with long days. Selecting the site with care, choosing early maturing crops and varieties, using transplants, fall seeding, mulching, and tunnelling are all cultural practices with special usefullness in northern circumstances.

The costs involved in growing three acres of vegetables is estimated at $11,926.53 or $3,975.51 per acre. Explicit assumptions, one specific crop selection, and 1984 and 1985 input prices were used to arrive at this estimate. Expansion of the acreage will change the cost of production per acre, especially if labour is replaced by machinery. Doubling the size of the garden will diminish the cost per acre by about 25 percent.

Farm gate sales are the most popular marketing method of market gardeners, more popular than pick-your-own operations or using the farmers markets. The need to bring customers out to the garden limits the potential sites of a market garden selling at the farm to those within a 40 mile (60 km) radius of major population centres. Native communities outside this radius will have to depend on other marketing channels or focus on food production for the community proper (subsistence market gardening), which will limit the expansion possibilities of the garden.

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Assuming that all produce is sold at the gate, fetching the average 1984 farm gate price, and assuming a fair yield for all the crops in the garden. The gross revenue of a three acre market garden can be calculated at $19,557.

The difference between revenue and costs of the example farm used in this report is $7,630.47 or $2,543.49 per acre; a result that is not out of line with published data.

Several organizational forms can be used by native people to start up and operate a market garden, such as family farm, partnership, cooperative, and corporation. The choice of one form over another will depend on local circumstances and the aspirations of the people involved. But regardless of the organizational structure, there will be difficulties in procuring financing because no mortgage can be held on land on reserves or Metis settlements. An arrangement between the Farm Credit Corportations and the Department of Indian and Northern Affairs makes FCC loans a possibility on reserves, but no such agreement covers Metis settlements. Other sources of assistance are available, such as the soil testing, tree distribution, irrigation, and market garden development programs.

In terms of jobs, a three acre market garden can be expected to provide work from May through September for one person, up to five helpers in the busy harvest season in September, and an additional one helper during planting. The total number of person weeks is estimated at 31.9. Larger gardens will use more labour, especially more management time. Substitution of machinery/capital for labour when the garden grows larger is a management decision and does not have to take place. Using labour intensive production methods will probably increase the cost per acre over capital intensive production, but may be more in line with social and community development goals. The approach taken in this report, i.e., to start small and grow from there, will enable the people involved to develop the business, marketing, and technical skills needed to run a larger market garden.

Market gardening in Native communities in northern Alberta is a feasible economic activity with good potential for training, community development, and job creation. Fresher and lower priced food can be offered to the community and in the surrounding marketplace. The figures and analysis presented here have been in general, i.e. not site specific terms, and it is recommended that an in-depth feasibility is done on site before a market garden is started up. Location specific research will test the extent to which the assumptions made in this report hold true and adjust the cost and revenue estimates accordingly. This second phase in the research will also be able to come up with an explicit implementation strategy and business plan.

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1. INTRODUCTION

A large percentage of all vegetables consumed in Alberta are imported from British Columbia, California, and Mexico. Of the many reasons that underlie this situation, the following three have direct relevance for the study at hand.

- Domination of few large supermarket chains in the food retail sector. In Alberta, the food retail sector consists of basically Safeway and Loblaws, with I.G.A. and some Co-op Stores on the margin. Large chains require large volumes of produce and very stringent delivery and grade standards, which are often hard to meet except for large scale producers.

- Strong links between established growers and the retail sector, links that are cemented with volume discounts and/or payments for shelf space. It is not unheard of that produce is dumped (i.e., sold below cost) in a market place where local producers are making an inroad.

- The traditional wisdom that the Prairies, and especially the northern parts, are only able to produce cereals and oilseeds, and the idea that production should be heavily mechanized and on a large scale.

But whatever the reason, it is clear that produce often arrives in the market in less than prime condition and at relatively high prices. Quality and price considerations are valid in the major centres, such as Calgary and Edmonton, but they become especially acute the further north one goes.

This study presents an analysis and discussion of the possibilities that exist to grow and market vegetables in northern Alberta by Native communities. Market gardening is to a large extent immune for the threads of the concentration of the retail industry, because it does not normally use the established retail stores to market its produce, but rather relies on farm gate sales and farmers markets.

Market gardens are not immune to the prejudice that vegetables only grow in California and that production on the Prairies is extensive and mechanized. Although very knowledgeable extention personnel is available, especially from the Horticultural Centre in Brooks, it is a common complaint that field staff of Alberta Agriculture have a bias towards the main stream agricultural pursuits of cereal, oilseed, and livestock production.

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The tradition of extensive agriculture shows itself in setting up market gardens in a rather grandiose manner. One of the most important reasons behind the failure of market gardens is that they start on too big a scale. Everything is relative and big in market gardening is not a section but rather 20 acres and up. In this report the focus is on a small market garden operation of three acres with possible expansion after the small operation is well established and successfull. It is felt that this strategy of starting small and growing when possible and needed is in line with the realities of northern Alberta with its dispersed population. But more than that being in line with the realities of northern Alberta, it is felt that this start small strategy is the right one for Native communities in northern Alberta, since they are often small themselves and removed from larger population centres.

The study is limited to Native communities in northern Alberta for two reasons:

- long transportation distances from the major producing areas of Alberta and the U.S. raise prices and lower the quality of fresh produce the farther one goes, giving more urgency for the establishment of a local source of supply.

- Market gardening is relatively underdeveloped in northern areas resulting in lesser levels of competition than would be the case in the southern part of the province.

Although certain agronomical practices are discussed at some length, this report does not purport to be a manual on the technical side of market gardening. Only those cultural practices which are particularly useful for gardening in the north are included.

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2.0 MARKET GARDENING

2.1 Market Gardening in Alberta

In 1984 there were 188 market gardens listed with the Alberta Agriculture Horiculture Centre in Brooks, 12 of which were in the Peace River Country, 10 in the Bonnyville area, and 5 around Fort McMurray. All the other 161 were around Edmonton or further south.

Apart from the 188 listed by Alberta Agriculture there are other, mostly very small, operations, and the provincial total is estimated at 400 with a total acreage of around 1700. Late is 1984, a market garden association was formed.

2.1.1 Part Time Farming

Most market gardens are run on a part time basis. This does not mean that market gardening is a form of agriculture that requires little labour; on the contrary, vegetable growing is one of the most labour intensive form of agriculture. The part time basis of most market gardens is more related to the relatively low level of development of the industry and to the fact that many successful market gardeners grow out of the industry and become commercial vegetable growers. It is estimated that 95% of the commercial growers operating in Alberta today started as market gardeners. Another reason for the part time nature of many market garden operations is the high level of energy that market gardeners are willing to expend on their operation. In season, the garden will require all evenings, weekends and holidays. Part time farming means that the operator has a source of income off-farm; it does not mean that the farm or garden only gets sideways attention. Part time market gardening does also not mean that the labour requirement is not very high at times. Especially during the harvest period, which, depending on the crops, can extend from June/July through to October, there is often a need to hire extra help.

2.1.2 Marketing Channels

Several marketing channels are available to the market gardeners. In decending order of importance they are

- farm gate sales
- pick-your-own
- farmers markets
- established retail outlets
- wholesale markets

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Farm Gate Sales

This marketing method entails that the vegetables are harvested, washed and trimmed by the farm operator, and displayed and sold at a central location on the farm proper. The advantages of this method can be listed as follows:

- immediate cash for crops
- no need for trucking or storing of produce, thus more return per acre
- impulse buying. The customer may come out for a certain product but may be swayed by the freshness and attractiveness of other vegetables.
- operator has complete control over the price

The major difficulty with this way of marketing vegetables, and this also applies to pick-your-own operations, is that one has to get the customer out to the farm. This marketing channel thus presupposes a willingness on the part of the customer to travel, and a knowledge of the customer where and when to come. As a rule of thumb it can be stated that a farm should not be further than 40 miles (60 km.) from a population centre and reachable from a main highway with as few turns on gravel backroads as possible. One way of telling potential customers about the availability of fresh vegetables at the farm sale is to market via farmer's markets, where you bring the produce to the customer, and build up a clientele.

Other disadvantages that can be mentioned are:

- need for adequate parking close to point of sale. It is advisable to ensure that the cars of the customers won't get stuck if the weather has been wet.

- difficulty to get customes out if the weather is poor.

- high harvest labour requirements

- liability for accidents of the farm.

Pick-Your-Own

Essentially the same as a farm gate sale operation with the exception that the customer harvests the amount that he/she requires. This marketing method reduces the amount of harvest labour that is needed, but increases the difficulty in managing when and where the crops are harvested. Most

Pick-Your-Own operations establish a system with numbered rows and require customers to pick certain rows, and only those rows. Supervision is needed to make sure that the customers do not stray into areas that are not yet ready for harvest, and that they do not damage plants and destroy produce. Prices should be lower than at the farm gate because the customer is required to put in the harvest labour.

Farmer's Market

Alberta Agriculture has a farmer's market programme set up to encourage the establishment of regular local markets. There are over one hundred farmers markets in the province, some privately owned, but most under the auspices of Alberta Agriculture. A rapid growth, indeed, if one considers that in 1974 there were only four.

Most markets levy a fee of between $1 and $15 per stall to cover collective advertising. In general, it is easier to get people out to a farmers market in the population centre than to get them out to the farm, and higher prices can be expected at the market than at the previous two channels.

Selling at the market presupposes, however, that you harvest the produce preferably on the same day or the day before and truck it to the market. It implies some form of cold storage to keep produce if the produce is ready for harvest before the weekly market day.

Wholesale and Established Retail Market

Selling to a wholesaler or directly to a local supermarket or co-operative is quite different from the above mentioned channels. Wholesalers and the produce managers of supermarkets require larger amounts of produce, want the producer to commit himself to delivery at specific times, and has stringent quality and grade criteria. This channel is really only useful for the larger grower who cannot sell all his production via the other methods.

All sales of produce through packers, wholesalers, retailers, restaurants, and hospitals etc. are considered commercial production and fall under the jurisdiction of the Alberta Fresh Vegetable Marketing Board (AFVMB). The exception is potato sales which are regulated by the Alberta Potato Commission.

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The AFVMB sets the minimum prices for fresh vegetables that move through the commercial channels and all sales must be made on AFVMB invoices. The AFVMB deducts 2% of all sales to cover its operation.

The involvement of the AFVMB is limited to commercial sales and does not extend to farmer's markets, farm gate sales or pick-your-own operations.

2.1.3 Pricing

The pricing decision is completely up to the market gardener with the exception of produce moving through commercial channels, which will be kept out of the analysis. As mentioned above, the prices on farmer's markets are usually higher than at the farm gate, which are in turn higher than in a pick-your-own situation, reflecting the descending amount of labour and other marketing costs involved.

The Alberta Agriculture Horticultural Centre in Brooke surveys the prices of a number of market gardeners on a weekly basis during the harvest season and sends out a flyer with price ranges to interested growers. This weekly listing can be used as a guideline in the pricing decision.

A second consideration in the pricing decision are the prices asked by other market garden operations and retail stores. Many growers price their produce in relation to the current prices at the local supermarkets; mostly a little below to attract customers to their farm and to compensate for the expense of getting to the farm. Thus, by pricing a little under the supermarket price, the customer gets better quality for a little less money, and can be persuaded to come out to the farm.

Knowing the cost of production is yet another way to price one's produce. Decide the price by adding a reasonable profit on top of the cost of producing the vegetables. Care should be take that all costs are taken into account.

One difficulty that sometimes occurs with farmers markets is competition from backyard gardeners, who dump their excess produce on the market. Since it is surplus produce of people who are not in it for the money, but rather for their own consumption, it happens that this produce is offered for sale at bargain basement prices. The result is that genuine market gardeners get stuck with unsaleable produce or that they have to meet the price and lose money

in the process. Although the process described here occurs, it is not a major difficulty with farmer's markets, and if the situation occurs it may be solved via the intervention of the coordinator of the farmer's market in question.

2.2 Northern Market Gardening

Although vegetable growing is normally associated with more southern locations, especially the Fraser Valley in B.C. and areas of California, it is possible to grow vegetables as far north as Inuvik, N.W.T. Special varieties and cultural practices have been developed in reaction to the special conditions of cool soils, long days, and short growing seasons.

A more northern location tends to have a shorter period between the last frost in the spring and the first one in fall (the frost free period), but makes up for it by having longer days in the summer. Fort Vermilion, for example, has an average frost free period of less than 80 days, but has 10% more daylight hours than Lethbridge in July. A commonly used measure to gauge the possibilities to grow crops is the number of degree days. Degree days are a measure of the total amount of heat units available to the crop and one degree day occurs when the mean temperature for that day exceeds 5.6°C by 1° degree. Peace River has only 10% less degree days than Edmonton.

These general measures should be used with caution and only indicate that there are no macro-level obstacles in the way of market gardening in northern locations. The specific site of any garden, however, is going to make a substantial difference in terms of frost free periods and degree days. Market gardens are small and should be placed in such a way as to make optimal use of micro climatic conditions. The slope of the land, closeness to a river or other body of water, and shelterbelts all contribute to the particulars of the climate in any one spot. The right spot and the right preparation can make or break a market garden operation.

2.2.1 Site Selection

Site selection should be done on the following criteria:

- Micro climate (see above)

- Fertility of soil. Since only a few acres are needed for a market garden, it may well be possible to find a plot that is substantially more fertile than the surrounding area due to, for example, old creekbeds or different vegetation. In orther words, a general soil classification of 4 or 5 does not have to mean that market gardening is not possible.

- Gentle slope. Especially in areas where frost is a hazard, it is recommended that a garden is slightly sloped with no obstruction, such as a hedge or fence on the lower end. Cold air gathers at the lowest spot and the described set-up ensures that frost pockets do not establish themselves in the garden.

- Shelterbelts. The garden should be protected against prevailing winds. Each foot in height of shelterbelt gives approximately 30 feet of shelter on the lee side. Crops are especially susceptible to wind damage in the sping when the plants are being established. Fall seeded crops such as winter wheat or fall rye can be considered as shelterbeds.

- Proximity to roads. Depending on marketing method this requirement may have overriding or very limited weight. A market garden that will sell at the gate or via a pick-your-own system needs to be easily reached by the customers. If the production is brought to a farmer's market, this requirement is not so important.

- Surrounding crops. Vegetables are very susceptible to herbicides used on cereals and oilseeds, and sprayed pesticides may drift into the garden if it is close to other fields and cause damage to the crops. If the plot to be gardened has been cultivated before it will be beneficial to know its cropping history due to possible pesticide residues.

2.2.2 Crop and Variety Selection

Different crops take different number of days to reach maturity and within each crop there are varieties that differ in this respect. Table 1 gives an indication of the number of growing days that different crops need to mature.

TABLE 1
Average Number of Days to Reach Maturity for Selected Crops

Crop	Number of Days
Radish	30 days
Lettuce	70 days
Peas	60-80 days
Summer Squash	75 days
Broccoli	80-85 days
Root Crops	100 days
Sweet Corn	100 days
Cabbage	100-140 days
Cauliflower	100-140 days

The figures in Table 1 indicate averages for crops that are seeded directly in the garden. By fall seeding, using vegetable transplants and special cultural practices, the number of days needed before a crop reaches maturity can be reduced substantially. Broccoli grown from transplants, for example, matures in 40-45 days, and cauliflower in 65-75 days.

A general typology of vegetable crops divides the crops in cool and warm season crops depending on frost tolerances and subdivides both categories into short and long season crops. Table 2 gives a listing of cool season crops that are grown in Alberta. Considering the frost danger it is likely that the selection of crops for a northern market garden will be made from this list. Warm season crops require more heat units and they also need extra care and attention in a northern garden.

TABLE 2
Cool Season Crops

Short Season	Long Season
Asparagus	Cabbage
Beets	Carrots
Broccoli	Cauliflower
Lettuce	Celery
Peas	Potatoes
Radishes	Rutabagas

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Within each crop there are many varieties available. Careful selection of the varieties will aid in both the ease of growing and marketing. Ease of growing is increased if the requirements of the particular variety can be met by the local circumstances and ease of marketing is increased if the product is close to the requirements of the markets. Variety selection should be based on one recommendation of the Brookes Horticultural Centre's Vegetable Production Guide, and not on recommendations of seed catalogues, because they often reflect the situation in more southern locations.

2.2.3 Cultural Practices

Certain cultural practices such as fall seeding, mulching, tunnelling and the use of transplants can be mentioned as especially useful for northern gardening. None of these practices is limited to northern locations but most will increase the survival chance of the plants, and reduce the number of days needed to reach maturity; both results that would make market gardening in the north more feasible.

Growing Transplants

All crops can be started in the protected environment such as a greenhouse, or a sunny window. The advantage is the control that the market gardener can exercise in the early and critical stages of the crops development and the higher survival rate that results from this increased control. Not all crops need to be started as transplants; many can be seeded directly in the garden.

The cost of growing transplants, connected with the special soil mixture needed, the greenhouse or shelter, the energy for heating the area and chemical control of diseases, will limit the number of crops that are started as transplants to those who will not grow or reach maturity if seeded directly into the garden. Most warm season crops, such as cucumber, eggplant, pumpkin and tomato will fall in this category, but some cold season crops, such as cabbage and cauliflower will benefit from the artificial extension of the growing season that is made possible though transplanting.

Fall Seeding

Another way to make optimal use of the length of the growing season is to seed the crop in the fall. Lettuce, carrots, onions, parsnips and spinach will all yield more and mature earlier, all other things being equal, if they are seeded before freeze up in October when the soil temperature is around 5°C.

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Mulching

Black or clear mulch (1.5 mm thick plastic) to cover the seedbed has proven to be beneficial to enhance earliness and yield of some crops by increasing soil temperatures, reducing soil moisture loss, and reducing soil nutrient leaching.

The idea is to cover a well prepared seedbed with the plastic mulch, which is available in width between 3'-6' and from 500' to 2000' feet in length, so that a tight fit is accomplished between the plastic and the soil. This tight fit is especially important if black mulch is used because the contact between soil and plastic is necessary for heat conduction.

Seeding or transplanting is done by punching the mulch, which has been covered on all sides by some dirt, and seeding/transplanting though the hole. The transplanted seedlings or the plant growing from the deposited seed will grow through the hole in the mulch and the root system will be in the part of the seedbed covered by the mulch. The result is that the soil is warmer and with better moisture and that the plant will do better.

Black mulch will not let any sun through and acts, therefore as an inhibitor of weed growth. Clear mulch does not inhibit weeds and a herbicide should be applied before the mulch is laid.

Best results have been obtained with vine crops, such as cucumbers, melons, peppers and squash. Substantial increases in yield, up to 2 or 3 fold increases, and up to two weeks earlier harvest have been documented. Mulch is not recommended for cole crops and potatoes where they increase top growth.

The application of mulch does not protect the plant from frost and seeding/transplanting should not been done earlier than is recommended.

Figure 1, on page 12, shows a seedling growing through a slit made in the mulch.

Tunnelling

A further development of the mulching technique is the addition of plastic tunnels to the mulch-covered seedbed after the crop is in. The tunnels will act as a miniature greenhouse and creates a warm and humid environment which increases the speed with which the crop grows and matures.

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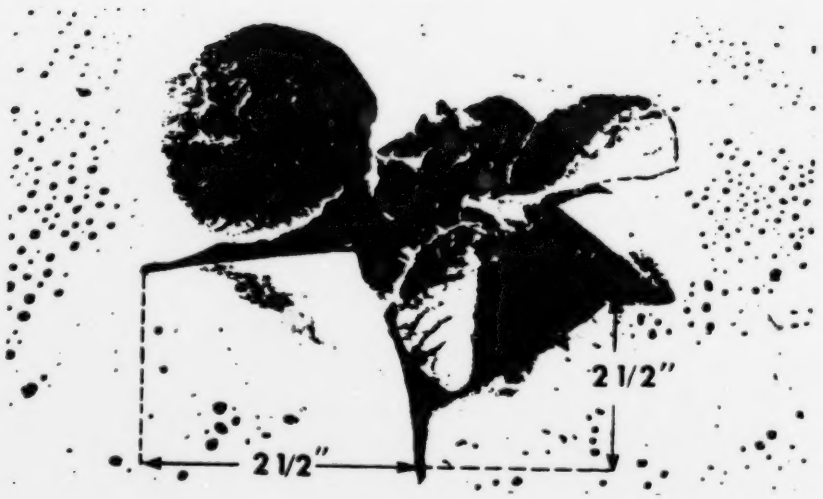
FIGURE 1

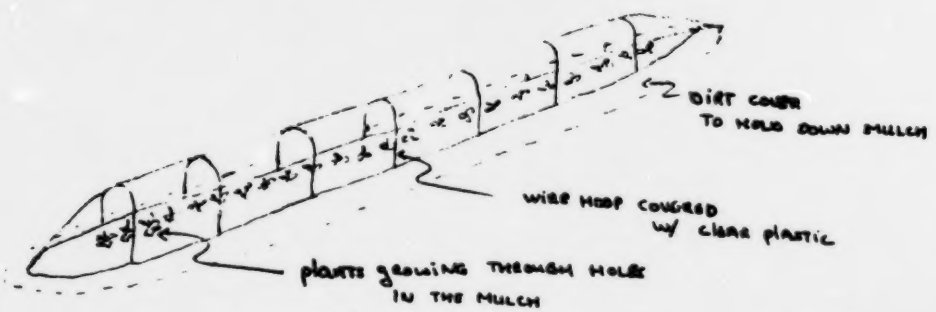


Clear plastic, with perforated small holes, for ventilation is stretched over wire hoops that straddle the mulch. Hoops are placed each 4-6 feet down the row and the plastic is kept in place by covering the edges with soil.

When the plant completely fills the tunnel, and the first signs of scorching of the leaves occur, the tunnel is split on the top and the plant is allowed to grow outside the tunnel. The use of tunnels has shown to give better yields than mulch alone.

Mulching and tunnelling, or plasticulture, is gaining in popularity in the province. In 1982 there were some 4 acres with mulch and none with tunnels, and this has increased to 40 acres of mulch and 25 acres with tunnels. Figure two shows a diagramme of a tunnel-covered row.

FIGURE 2



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2.2.4 Fertilization and Pest Control

High production per acre also means high nutrient needs per acre. Market gardening will require the replenishment of soil nutrients in order to sustain yields over time. The vegetable production guide gives the fertilizer requirements and recommended application times for different crops. As a general caveat, it should be mentioned that actual fertilizer needs will depend on the actual amount of nutrients available in the soils and soil tests are, therefore, strongly recommended.

Pest control, the control of weeds and insects, is a major task in market gardening. Weed control can be accomplished by manual and cultural methods such as hoeing and black mulch, but also by chemical means through the used of registered herbicides.

Insect control pretty well needs chemical intervention and timely intervention at that. For detailed description of pests that can be expected and how to combat them, the Alberta Vegetable Production Guide is recommended.

2.3 The Economics of Market Gardening

2.3.1 Cost of production

Reliable cost of production figures are hard to come by for all agricultural production, but especially for market gardening. The major difficulty stems from the fact that soil, size of operation, and management, all major factors in the cost of production, are very variable, even for operations that are geographically close. On larger distance it becomes very difficult to compare farms. Cost of production data that are based on surveys of actual farmers should be treated with great care because they often draw conclusion from comparison between apples and oranges. A second difficulty lies in the poor records that many farmers keep of their operation so that the figures that they submit in reaction to a survey may be little more than educated guesses. Thirdly is the difficulty of timelines: input prices vary over time and not always in the same way as for example the Consumer Price Index. An easy way of updating figures is thus often not available.

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All the above difficulties described above are true for the estimation of the cost of production of a market garden. Added difficulties lie in the small scale of many gardens so that a cost of production per acre, which is the usual measurement, become virtually inoperable because an acre of a market garden often contains more than one crop. Then there is the issue of mechanisation: A mechanised operation is more easily captured in figures than a more labour oriented garden. How does one value the time of the owner operator, especially if he/she has a full time job on the side. In view of the above, this study will only use published cost of production figures as a benchmark. Rather, to gain insight in what it costs to operate a market garden, this study will present a budget for a three acre market garden in Native community in a northern location and cost out the expenses that can be expected using current - ie. spring 1985 - figures.

This hypothetical garden will grow seven (7) cool season crops, three of which store well. The crop selection is basically arbitrary but has been made in such a way that it includes only crops which have proven to be well adapted to northern Alberta, and which can form a major component of the food intake of local consumers.

The following crops were included in this costing exercise:

Potatoes	1 acre
Broccoli	.3 acre
Cabbage	.5 acre
Carrots	.3 acre
Cauliflower	.3 acre
Peas	.3 acre
Onions	.3 acre
Total	3 acres

Only seven crops were included and the total acreage was restricted to 3 acres to obtain some similarity to a market garden in an early stage of development. Three acres can be tended by mainly manual methods and seven crops will ensure that sufficient attention can be given to each crop. Appendix A gives the full costing details and sources for the summary of costs presented in Table 3.

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Table 3
Summary of the Cost of Production of a Three Acre Market Garden

Fertilizer	192.85
Chemicals	51.00
Seed	453.60
Machinery Operating Costs	300.00
Hired Labour	5646.00
Marketing	200.00
Mulch and Miscellaneous Supplies	125.00
Subtotal	6968.45
Interest on Operating Capital	500.00
Interest on Long Term Capital	3478.08
Subtotal	10945.53
Depreciation	980.00
Total	11926.53

Source: Appendix A

Inspection of the figures show the great weight that labour costs have (more than 45% of the total), while for example the chemical components is very small (less than 1%). These results are not out of line with other estimates of costs of production for a market garden, and should alert a market garden operator to the importance of careful management. If slack management increases the amount of labour that is required by even a small percentage, the resulting cost increase will be dramatic. An increased labour requirement may stem from letting weeds get out of hand, poor training of helpers and a host of other factors.

Another major cost factor is the interest on long term capital borrowed to get the garden started. In the situation presented here this cost disappears after 5 years of operation, because the interest cost have been calculated for a 5 year payback period. Any actual situation is likely to be quite different from this example because, for example, the need to include land clearing cost or because of grant money that the operation may be able to tap. Merely changing the payback period to 10 years reduces the monthly payment to $190.64 and, consequently the yearly cost to $2287.65.

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This cost estimate should be used with great care. It is not implied that three acre market garden with the above mentioned crops will cost $9036.67 to operate in a year. No, the exact and actual production costs of a market garden will depend on the actual location and circumstances. All that can be read from these estimates is that, if the assumptions hold true, the cost of production should be in the $9000 range.

Each individual circumstance will be sufficiently different from the example garden that is costed out here to create a considerable difference in the numbers. To bring the estimate close to any one real world situation, one should carefully investigate to what extent the assumptions used hold true. For example: is the wage rate used ($6/hour for management and $4.50 for helpers) applicable, is land cost zero, etc.

Figures presented here show the cost estimates of a three acre market garden in operation. To reach this stage little or substantial investments in time and money may have to be made depending on the circumstances. If the site chosen for the market garden is not cleared, it will probably take several years and considerable money before the plot can be used for farming. The cost of walking down, piling, and discing one acre with medium bush cover totalled $190 in 1984. If the land is cleared but e.g., in grass there will be a need for extensive dishing before the land is ready for vegetable growing. In general it is recommended to fallow a plot before one uses it for vegetables. This makes weed control possible and ensure that no chemical residues will endanger the plants.

It is also assumed that there is enough water available for the irrigation (60 gallons/hour) by means of a well or a dugout. The costs of these assumptions, i.e., good plot available, with enough water, are not taken into the analysis because the variability between potential spots is too great.

2.3.2 Cost of Production and Size of the Operation

Figures presented in Section 2.3.1 assume that a three acre market garden, which is the size of garden that can be maintained by mainly manual work. It is also a size of garden that can be started with relatively low capital expenditures and which can thrive even if no large population base is available. Section 3 will discuss some of these considerations in more detail.

It is usefull to give some indication of the cost of production of larger market gardens. One way to estimate these costs is to calculate a budget for a 6, 15, etc. acre operation and compare the results. Another way, which has been chosen here, is to take from the Alberta Market Garden Production Study (1979) the differences in cost of production by acre for operations of different size and abstract cost ratios. These cost ratios will then be applied to the figures used in this report.

Table 4

Comparison of Total Cost by Size Group in $/Acre

Size (in acres)	1-3	3-10	10-20	20+
Total Cost/Acre	2704.75	1966.21	1981.34	988.47

Source: Alberta Market Garden Production Study (1979)

Care should be taken not to compare these figures in absolute value with the results presented in Section 2.3.1. The numbers in Table 4 are averages for a range of sizes, use dated information, and are not built up exactly the same as the numbers of Section 2.3.1.

From Table 4, it can be calculated that the average total cost per acre for the 3-10 acre group is 0.73 times the cost for the 1-3 acre group. For the 10-20 acre group this factor is 0.55, and for the 20+ group 0.37. The deminishing costs per acre with the increase in garden size are referred to as economies of scale and find their reason in, among others, higher level of mechanization and higher labour productivity and lower per unit cost for bulk inputs with large orders.

Using these cost factors, the total production cost of larger operations can be estimated. Table 5 gives the cost of production estimates by size. These figures should be used as a rough indication only, since they were derived using averages and estimates, and are not crop specific.

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Table 5

Cost of Production Estimates by Size

Size (in acres)	3	3-10	10-20	20+
Cost/Acre*	3975.51	2902.12	2186.53	1470.94
Total Cost**	11926.53	18863.80	32797.96	36773.47

* Calculated using numbers from 2.3.1 and cost factors derived in 2.3.2.

** Total cost calculated using midpoints of indicated ranges i.e., 6.5 acre, 15 acres, and 25 acres.

It is not necessary to grow along the lines that other market gardens have grown. The figure presented in Table 5 presume that an increasing amount of mechanization takes place. Historically it has been the case that larger market gardens use more machinery, but whether to use more equipment or not is a choice that is up to the operator. If the special circumstances are such that a more labour intensive expansion path is preferred, for example if job creation, training, and community participation are among the goals of the market garden operation, then it is possible to do so. In this case the cost of production figures per acre will not change dramatically with size and total costs would be related in a linear way to the calculated costs of our example 3 acre farm.

Straight economic consideration would make a garden operators use more machinery if the garden is expanded: lower per acre costs would increase the economic viability of the garden. But then, there are other considerations than the purely economic.

3.0 Northern Market Gardening and Native People

3.1 Markets

3.1.1 Commercial Market Gardening

As mentioned in section 2.1, there are several methods of marketing the produce of a market garden. In this general analysis of the economics of market gardening, we will assume that all production of the garden will be sold at the gate. This assumption can be explained by the fact that gate sales are the most popular way of marketing for market gardens and that the relatively small size of our example market garden does not presuppose large numbers of customers to dispose of the production. The gate sales assumption will be further discussed below.

To be able to calculate the returns on the production of vegetables it will have to be established how much of each crop can be expected to be produced and what kind of price can be expected. Yields have been taken from Hausher (1985) and represent not the high or low end of yield possibilities, but a yield that can be considered fair. Caution should be taken here: the yield of each crop or the whole garden and consequently the revenue of the whole operation can be as low as zero (0). This could be the case if frost wiped out the garden before harvest.

The price that has been used is the average farm gate price for each crop over the 1984 season as calculated from the weekly price survey done by the Brooks Horticultural Centre. Thus if yields may be overestimated for nothern locations, price is probably slightly underestimated.

Table 6
Production and Gross Revenue
of a Three Acre Market Garden

Crop	Fair Yield Per Acre (in kg)	Acreage	Total Yield (in kg)	Gate Price in ¢	Gross Revenue in $
Potato	9,000	1	9,000	66.1	5,949
Carrot	6,000	.3	1,800	99.1	1,784
Cabbage	10,000	.5	5,000	66.1	3,305
Onions	10,000	.3	3,000	99.1	2,973
Cauliflower	6,000	.3	1,800	176.2	3,171
Broccoli	2,000	.3	600	165.2	991
Peas	2,500	.3	750	187.2	1,404
Total					19,557

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One conclusion that should not be drawn from the above figures is that the low yielding Broccoli, for example, should be replaced by onions to increase the total return. This switch may increase the total return on the operation but only if additional markets are available. If these onions are hard to market and have to be stored then it may well be that the immediate cash returns of the broccoli are to be preferred over the uncertain and delayed returns of the onions. The market, that is, what can be sold in the actual situation, should be the ultimate judge of the crop selection and consequently the protential returns on the the operation.

The assumption that all produce will be marketed at the gate needs some further examination; which reserves or settlements are in a position to market their surplus this way? To investigate this question, the following procedure can be used: Identify all major towns with a population of more than 1000 and draw a circle with a radius of 60 km. around each of them. The 60 km. radius reflects the industry wisdom that customers will not travel further than that distance over relatively good roads to get to a garden. All Native communities inside the circles can be considered as the possible location of a commercial market garden. Land that lies outside the area, thus indicated, can be considered for a commercial market garden using the farmer's markets as the main marketing channel, or as a subsistence market garden (see section 3.1.2).

It should be noted that the only reason to separate commercial and subsistence market gardening, is clarity in the analysis. A market garden that can market its produce at the gate to nearby city/town dwellers, will also market to the people of the community in which it is located. Conversely, a market garden in an isolated community which is directed to marketing in the community itself may be in a position to sell some of the produce in another small community nearby.

To illustrate this approach an example may be usefull. High Prairie is a community of 2500 inhabitants and constitutes a good potential market for locally grown produce. The following reserves and settlements are within 60 km. from the townsite: Pakashan, Halcro, Freeman, Sucker Creek, Driftpile River, and East Prairie. Driftpile River is also within 60 km. from Slave Lake, a community of 4500 people. All communities mentioned here have good road access; East Prairie Settlement is serviced by an all wheather gravel road.

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There are a considerable number of Reserves and Settlements to satisfy the conditions of limited distance to a population centre and relatively easy access. It is possible to narrow the number of potential sites down further by applying more stringent critiera of distance and access. However, it is felt that consideration such as soil and especially willingness of individuals to become involved in market gardening are more important variables that should be taken into account in the determination of actual sites.

3.1.2 Subsistence Market Gardening

Many reserves and isolated communities are a long way from major population centres. The 60 km. rule of thumb effectively eliminates many reserves and isolated communities as the location of a market gardening catering to city and town dwellers, unless there is a willingness to transport the produce to the farmers market and incur the costs.

The discussion of market gardening and the marketing methods in section 2 is not made irrelevant by the above observation. What is needed is a definition of the market and structure of the market garden in such a way that it will cater to the community in which it is situated.

This orientation of the garden toward the surrounding community has as a result that the size of the market will remain relatively small in most cases. The result for the community is a lessened dependence on food brought in from outside the area, often at great cost.

It is illustrative to look at the production of the three acre farm that has been used for the cost of production calculation in terms of people that it can support. If fair yields for storageable crops are assumed we can expect the amounts of produce shown in Table 7.

TABLE 7
Production of Selected Storageable Produce

Crop	Production In Kg.	1982 Per Capita Disappearance	Availability Per Year	# People To Use Production
Potato	9000	69.72	.75	172
Carrot	1800	8.72	.75	275
Cabbage	5000	6.13	.75	1087
Onions	3000	6.88	.75	581

These four crops (Potatoes, Carrots, Cabbage, and Onions) store well and could be kept for up to eight or nine months. One way to estimate the number of people that this amount of produce can feed is to use the per capita disappearance figures that are available from Statistics Canada (Handbook of food expenditures, prices, and consumption). The per capita disappearance figures give a very broad indication of consumption and will underestimate the consumption of the commodity in the situation at hand where, the freshness, availability, and pricing will stimulate the consumption above the global levels indicated.

Cauliflower, Broccoli, and Peas don't store well and should be consumed soon after harvest. The perishability of these crops makes the use of per capita disappearance figures not feasible, since they are based on year round consumption. But an inspection of fair yields indicates that the immediate consumption of the total production of these crops does not presuppose a large population.

Table 8

Production of Selected Perishable Crops

Crop	Production in kg
Cauliflower	1800
Broccoli	600
Peas	750

A market garden in an isolated community or reserve, provided that it is set up on a small scale and has a crop mix that is well adjusted to the local circumstance, is viable if it has to rely on the reserve or community in which it is situated. In the above example it would be wise to plant fewer cabbages and include more crops in the garden, but the figures as presented show that a relatively low population density of less than 500 people would use all the production of a three acre market garden.

3.2 Organizational Structures

3.2.1 Ownership and Tenure of Land

The discussion in this section will outline some of the advantages and disadvantages of different organisational structures that could be used for a market garden. For all three organisational forms it is relevant to shortly describe the ways in which individuals can hold land on a reserve, settlement, or isolated community.

Reserves are under federal jurisdiction, and an individual band member can obtain possession of land on the reserve through an allotment of the land by the Band Council with the approval of the Minister of Indian Affairs. The documentary proof is a Certificate of Possession (or a location ticket if the land was allotted before 1951).

Using part of reserve land for business purposes creates no problem if the proprietor of the business venture is a band member, or if all partners are band members. The inclusion of a non-member partner or the incorporation of the business necessitates that the procedures, which allow non-indians to occupy reserve land, are followed. A company, even if all shares are held by the band or by individual band members, is a separate entity and does not have the same rights on the reserve as band members. A company, as well as a partnership with non indian participation, requires a lease of the land. The company would have no special tax status.

The band as such can choose to operate a farm or market garden on unallotted reserve land. Since bands are generally not considered a legal entity, no coporation or other legal entity would be formed by the band in order to run the farm.

Focusing on Metis Settlements the following picture arises. It should be noted that the Metis Betterment Act and regulations are under review and that a report on new legislation drafted by the McEwan Joint Metis Government Committee was published in July of 1984.

Metis settlements fall under provincial jurisdiction. Land is allotted to an individual member of a Settlement Association by the Board of the Association with approval of the Minister, and a Certificate of Occupation will be issued on application provided the settler has made certain improvements to the allotment over the period of one year. The interest in any parcel of land or improvements thereon cannot be seized under legal process, and can only transferred to other members of the Settlement Association.

Isolated settlements are to be considered equivalent to all non-reserve/non-settlement land. Depending on the situation the title to the land may be held by an individual or any other legal entity including the Crown. The transfer of the land the use thereof will be dependent on the particular case at hand.

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Section 3.2.2 will discuss some of the features of each type of organisational structure that could be considered for a market garden operation. The choice of one option over the other is dependent on the particular situation, the ambitions and views of the participants, and of the community as a whole.

3.2.2 Organizational Structure

Individual or Family Farm

Perhaps the simplest of all available organizational structures available. All that needs to be done is to obtain possession of a suitable plot of land and enough money to start up and operate the garden. The advantages of this form of organization lie in its simplicity and in the fact that a individually operated market garden could be the extention of an existing backyard garden. If this latter situation exists, the evolution of the garden may be relatively painless, since existing skills, systems, and expertise are already available. What would be needed is a further development, through training and perhaps financial support, of what already exists.

It is likely that some labour from outside the family unit will be required at times such as harvest. This labour would take the form of temporary hired hands.

The major drawbacks to the family farm of the operation are its informal nature and the limited spread of the benefits coming from the activity throughout the community. Especially when it comes to labour, the family farm has a tradition of using unpaid family labour extensively. No mechanisms exist to ensure that records are kept, labour is hired and paid in a fair way, or that management reacts adequately to the market situation.

Partnership

Basically the same situation as above except that the drawbacks are moderated somewhat. The gains from the activites will be spread wider, namely to the partners (and their families), and the interaction between partners may constitute a check against poor management.

Cooperative

A formal framework under which different individuals cooperate to a common goal, in this case a market garden operation. Benefits accruing from the garden will spread over all the members of the cooperative in the farm of wages plus a distribution of possible profits by year end, or as a portion of net receipts as they are earned. Decision making can be cumbersome if many people are involved, but the cooperative is

an excellent vehicle to draw upon a larger reservoir of skills and enthusiasm. Conversley, new skills learned in the process of gardening will be shared among the cooperating 'owners' of tne enterprise. A cooperative should be considered as a organizational structure where the existing situation is one of several active backyard gardeners and/or where community development is valued.

Corporation

Easier to set up and run than a cooperative, a corporation could be set up by individual band, settlement, or community members or the Native community as a whole. Benefits accrue of the shareholders, through dividends, and to the employees, through wages. The management structure of a corporation is inherently more hierarchical than that of a cooperative, which can lead to less identification of employees with the operation and, consequently, less motivation to work optimally. If the shares of the corporation are vested in the band, settlement, or community, then the benefits accrue to the Native community and all its members.

3.3 Funding and Assistance Programmes

No claim to completeness is made in this discussion of funding and assistance programmes. Emphasis is placed in this section on the special circumstance of market gardening and not on the more broad concept of economic development. Consequently, monies available through the Federal Department of Indian and Northern Affairs are largely kept outside the discussion, and the focus is kept on assistance for market garden operations in Alberta, with special references to the fact that the gardens would be located in Native communities.

Technical assistance is provided.

Special arrangements have been made between the department of Indian and Northern Affairs and the Farm Credit Corporation (F.C.C.) to enable a band members, individually in the form of a corporation, to obtain credit from the F.C.C. Under normal circumstances the F.C.C. insists on a first mortgage to secure their loan. But in the case of loans to band members for farming on reserve land, where it is impossible to take out a mortgage, the arrangment gives the F.C.C. recourse to the Minister of Indian and Northern Affairs if the account is in arrears and foreclosure action would be the normal step. It should be noted that the F.C.C.'s regulation requires that the lender is a legal entity, that is a person, corporation, or other organization structure. Since a band is not a legal entity per se, although it can choose to incorporate, care should be given if a band decides to start a farm or market garden operation on unallocated land. This construction may make it difficult to secure credit from the F.C.C.

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The Agricultural Development Corporation, the lender in last resort for farm enterprises in Alberta does not have a similar arrangment with the Departm,ent of Indian and Northern Affairs and, consequently, the inability to foreclose on reserve land, makes the ADC very reluctant to lend money to natives for the purpose of farming.

Metis settlements face similar difficulties as Reserves in that the land cannot be alienated. No agreement between the F.C.C. and any government agency such as the Metis Development Branch of the Native Affairs Secretariat, exists which means that the loan guarantee and the F.C.C. loans are not available to Metis using settlement and for the purpose of farming.

Settlement Ooniyaw Corporation, the Economic Development Corporation of the Metis settlements and the Metis Development Branch of the Department of Municipal Affairs may be sources of funding or help.

As far as isolated communities are concerned, the situation is dependent on the actual legal claim on the land. Only if it is possible to alienate land, or in other words only if a lending agency can secure a loan by a mortgage on the land, it will be possible to obtain money from commercial or government sponsored lending agencies.

Other programmes or funds that may be available for a market garden operation include:

- Irrigation Assistance

  Through the Federal Prairie Farm Rehabilitation Administration (PFRA) producers who qualify can obtain financial assistance for the development of small irrigation projects.

  Projects must be at least 2 hectares (5 acres) in size. The applicant must be bona fide farmer.

  Assistance is one-third of the eligible cost or specified unit prices to a maximum of $2200.00 per project.

- Tree Distribution Program

  Alberta Agriculture will supply basic shelterbelt trees and shrubs of seedling size for the purpose of establishing windbreaks. The planting material is free except for shipping charges. Orders are taken on a first-come-first-served basis and must be placed with the District Agriculturist's office by November 1st. The applicant is expected to adhere to simple guidelines regarding preparation of site, planning, care, and that the plant material is used for the purpose intended.

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- Soil Testing Program

Farmers, gardeners and greenhouse operators can obtain soil tests from the Alberta Soil and Feed Testing Laboratory located in the O.S. Longman Building.

Soil test kits are available from the District Agriculturists. The kits contain shipping boxes, information sheets and instructions for sampling and mailing. There is a charge of $15.00 per sample set. This includes analysis of a surface sample 0"-6", and two subsurface samples 6"-12" and 12"-24".

A test report showing fertility levels of basic soil nutrients and other pertinent information, such as PH, salinity, organic matter, free lime and texture along with fertilizer recommendations will be supplied to the grower.

- Plant Diagnostic Services

This service is provided by a number of Regional Crops Laboratories. These are located at Vegreville, Brooks (A.H.R.C.), Olds and Fairview.

These laboratories diagnose problems and advise clients regarding control measures relative to disease, insect and weed problems. Diagnosis is normally made from specimens submitted to the laboratory. The proper procedure for collecting, preparing and shipping specimens, completing case histories and information sheets are most important. Individuals can contact the local District Agriculturist or Service Board Fieldman, etc. for assistance in using this service.

- Vegetable and Potato Storage Programme.

Objective: to improve the productivity and viability of the vegetable industry in Alberta.

Amount of loan: Maximum loan amount eligible for incentive is $100,000.

Incentive: $70 per $1000 of original loan amount eligible is paid annually, for five (5) years, after a complete installment of principle and interest has been paid on the loan. The total incentive paid to an applicant, however, cannot exceed the actual interest paid on the loan.

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Terms: As per Alberta Farm Development Loan (A.F.D.L.)

Purpose: Constructing new potato and vegetable storage facilities; modification or improvement of existing storage facilities including ventilation, humidification, and refrigeration equipment, such as bin loading and unloading equipment, graders, vegetable and potato washing, waxing, grading, and handling equipment, but excluding motorized mobile equipment.

Available to potato growers who are licensed by the Alberta Potato Commission and vegetable growers who are members of the Alberta Fresh Vegetable Marketing Board.

- Federal Fruit and Vegetable Storage Construction Financial Assistance Programme.

Assistance to producer groups for the construction or renovation of specialized fruit and vegetable storage facilities.

Assistance is available for 1/3 of the cost to a maximum of $500,000. The applicant must be a primary producer group of at least three members, such as a producer association, cooperatives, etc. This also includes family partnerships of three or more, e.g.: husband, wife, and son or daughter, or three brothers, etc. No individual in a group may have a capital interest of more than 40% of the total group capitalization . It is necessary to obtain approval of the application before the start of the project. Please note that the present programme expires in March 31, 1986. It is not yet known if it will be renewed.

- Market Garden Development Programme.

This programme is a development grant for the purpose of increasing market gardening in Alberta. The amount of the grant is $750.00 for a minimum of one hectare (2.5 acre). Eligible crops include all vegetable field crops commonly produced in Alberta, including strawberries and raspberries. Potatoes are not included.

A market gardener must produce, harvest and sell all produce from a minimum of one hectare of land (10,000 square meters) (2.5 acres) fully planted to the eligible crops.

Vegetables must be planted and grown under normally acceptable cultural practices. This includes soil preparation, row and plant spacing, suitable varieties, adequate weed and pest control, irrigation where applicable, etc.

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The grower need not be licensed with the Alberta Fresh Vegetatble Marketing Board unless a portion of his production is sold through commercial channels.

A producing unit can only receive this assistance for a maximum of two years. There can be only one claim for each market garden.

Growers must file an Intent to Claim by July 1 of the crop year. These forms will be included with the Market Garden Newsletter or can be obtained from the Alberta Horticultural Research Center, Brooks or the Alberta Tree Nursery & Horticulture Centre, Edmonton.

Each application will be inspected and claim for payment forms will be forwarded to the applicant if eligible.

Anyone planning to use water from a natural source must obtain a water license from the Watering Licensing Section of the Alberta Department of Environment, located at Oxbridge Place, 9820-106 Street, Edmonton, Alberta, T5K 2J6. Phone 427-6244 or through the P.F.R.A. or Irrigation Specialist of Alberta Agriculture. A license is required if one acre of more is to be irrigated. A license protects the rights of the owner.

- Extension Program

1. Short courses covering vegetable and small fruit production and marketing - usually 2 to 3 locations per year - 3 days in length.

2. Field Days: a number are conducted each year, such as Market Garden Field Day at A.H.R.C., Edmonton research plots, Potato Field Day, etc.

3. Tours to visit established Alberta growers (usually 2 tours per year).

4. Extension publications:

   a) Alberta Vegetable Production Guide
   b) Numerous fact sheets and bulletins
   c) Market Garden Newsletter
   d) Produce Notes Newsletter
   e) Market Garden Price Survey
   f) Alberta Market Gardeners List

5. General Extension Services - Alberta Horticulture Branch personnel can supply information on horticultural topics such as vegetables, potatoes, fruit, greenhouses, storage, shelterbelts, weed and pest control, etc.

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3.4 Manpower Needs and Training

It will be beneficial to focus especially on manpower needs to bring out some of the economic and social benefits that can be derived from market gardening, that are relevant for situation of in Native communities in Northern Alberta.

Table 9 gives a summary of labour needs. A person week is set at 30 hours to maximize efficiency and the number of people involved.

Table 9
Seasonality of Labour Requirement of a Three Acre Market Garden

	Total Hours	Person Weeks
Pre-season	12.5	0.4
Planting	60.0	2.0
Summer	348.0	12.0
Harvest - production	525.0	17.5
- sales	128.0	4.3

Source: Appendix

These figures can be translated in actual jobs that would be created by a market garden operation by including the factor time in the calculation. Planting can be done within the span of one week; harvest will probably stretched out over time with the major need for labour over a 4 week period in August and September. The summer period extends from June to the end of August for some 12 weeks.

Combine the seasonality of the labour needs and the obvious need for continuity, at least for the management, the following picture emerges.

Table 10
Labour Requirements in Terms of Positions

Number	Position	Time Period
1	Manager	May-September
1	Helper	May for Planting
5	Helper	September for Harvest
1	Sales person	Weekends in August September

It should be kept in mind that the unit of analysis is a three acre farm with low capital investment and consequently a dependence on manual labour. Larger gardens have tended to become more mechanized and this results in a decline of the need for labour on a per acre basis. As mentioned before depending on the local situation of a market garden in a Native community, this growth path does not need to be followed. If labour is abundantly available and the management decides to expand the garden it is possible to choose labour intensive technology and expand the labour needs of the garden in a linear relationship to the size of the garden.

Market gardening puts a considerable importance on the management. To put it in another way, management is one of the most important factors in the success or failure of a market garden. Reasons for this importance of management include:

- Timing is critical. Crops should be seeded or planted at the earliest moment it can be done safely; insect infestations need to be acted upon immediately; vegetables should be marketed at their prime unless one is willing to produce a lot of garbage.

- The produce is marketed locally so that a thorough understanding of the local market needs to be developed.

- To sustain production over time, there is a need for prudent management of the soil resource. Well managed soils can improve over time and continue to yield good harvests; poorly managed soils will be soon depleted of nutrients and be subject to erosion.

- A need of a thorough understanding of all that is needed to grow vegetables. Included here is a sound knowledge of fertilizers and agriculture chemicals, crop and variety selection, and harvesting techniques.

Many of the skills described above take special effort and training to acquire, but some of them are more easily found. Where there are backyard gardens in operation, the step to a true market garden will need only the upgrading of certain skills. It is possible that the only thing that is really needed is the introduction of some new techniques in the marketing area because the standard agronomical practices and market knowledge is already firmly in place.

Larger operations will require more business skills such as record keeping, personnel management, and more extensive marketing skills. In the analysis presented in this report it is being stressed that the prudent way to start a market garden is on a small scale. The special skills needed for a three acre garden can be obtained by realtively simple extension efforts. The market garden courses given by the Brook Horticultural Centre will probably suffice. Another way is to establish a good working relationship with the local District Agriculturist and/or Fieldman. Although the extension services are often biased in favour of cereal production, fieldmen and D.A.'s can

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be good source of information, or at least, a good reference point. It should be noted that it will be up to the market gardener to establish this relationship; if the initiative is left at the extension services, it will be unlikely that any action will occur.

Larger operations; will be well served with a manager with a sound knowledge of agriculture acquired through an agricultural college such as Olds or Lakeland, on a University. It may not be necessary for the manager to have completed the full programme of any one of these institutions; an informed choice of course may yield the specific knowledge needed for a market garden operation. Again if the growth path associated in this report, i.e. start small and grow from there, is followed, it will be possible for the operator/manager to grow along with the garden. There is no better schooling than experience and a larger market garden managed by an operator with experience and a well chosen "book knowledge' should be well covered against major management errors.

Working in a market garden will constitute a training opportunity for all who are involved in it, not only for the manager. The timing sensitive nature of a market garden puts extra importance on the punctuality of all workers. Fragility of transplants and seedlings will take care and attention; all skills that are useful for other jobs as well.

It should be noted that training has a direct link to the availability of credit. All lenders are more willing to supply funds if they have confidence in the creditials and knowledge of the farmer/garden operator.

4.0 CONCLUSION

The analysis and discussion in the previous sections can be well summarized by recapitulating the cost and revenue figures that were presented. Focusing on the costs and revenues indicates that the primary viewpoint, that was taken in this study, is an economic one. Market gardening is first and foremost an economic activity aimed at producing real benefits in the form of money earned and lower food prices.

Lower food prices have not explicitly been taken into the analysis, although it was noted that a market graden operator often prices his produce a little below the current prices at the nearest supermarket. All customers benefit from these lower prices in a real, monetary way equal to the amount by which the price is lower times the amount of produce bought. Especially in the case of subsistence market gardening this monetary benefit through lower prices may be an important factor in assessing the desirablity of a market garden in the community. On top of this potential monetary benefit to the community, one can mention the less tangible benefits of availability and freshness of the produce. The amount by which food prices can be lowered, if at all, will depend on the local situation and will require site specific work to be determined.

Costs and revenues that can be expected from a market garden operation have been explicitly analysed. The method chosen was a budget approach in which an example market garden of three acres with a specific crop mix was analysed with respect to costs and revenues, using 1984/85 prices for inputs and production. A range of assumptions were necessary to be able to perform this calculation and only in as far as these assumptions hold true, can one have faith in the figures that the budgeting exercise yields. Table 11 summarizes the costs and returns of the example operation used in this report.

Table 11
Summary of Costs and Revenue
of a Three Acre Market Garden

Total production costs	$ 11, 926.53
Total return	$ 19,557.00
Revenue over cost	$ 7,630.47
Revenue over cost (per acre)	$ 2,543.49

Source: Appendix A and Section 3.11

Realizing that it has been said before in this report, it should be noted that these figures should only be used as a general indication of the feasibility of a market garden operation and not as figures to base an actual operation on. Local circumstances must be taken into account to come up with a realistic assessment of the feasibility of any particular operation.

Please note that fair yields have been assumed in the calculation of revenues. If yields were 10% less across the board the return would have been reduced by 10% to $17,601.3, which would have kept the operation well above the break even point. In other words, the operation of a market garden is feasible even if the yields have been overestimated, which may be true for locations in the far north of the province.

Figures presented in table 11 are not out of line with those presented in the Alberta Market Garden Production study and other publications.

Even though economic considerations were foremost, social and community development issues are part of the discussion of market gardens in Native communities. There is no need for economic and social considerations to be mutually exclusive. Indeed, the economic feasibility of the three acre garden is enhanced by staying away from mechanisation and relying on labour intensive methods of production. In this case, job creation, community involvement and optimal returns are not contradictory. The same goes for the implementation strategy that is used in this report, ie. start small and grow slowly. Modest beginnings limit the capital requirements, limit the consequences of inexperienced management, give room for training and slowly increasing community involvement, and have shown to be more likely to lead to economic success of the operation.

At a certain moment there will be a trade off between, for example, job creation and cost of production: A larger market garden using little or no machinery and lots of labour will probably exhibit a higher cost of production than a comparable mechanized operation. If and when a decision needs to be made it will be valuable to have the experience and knowledge of a small operation.

Market gardening has been shown to be a feasible undertaking, in general terms, for Native communities in northern Alberta. Using this general feasibility and location criteria set out in this report, it is now possible to proceed and select potential sites for actual market garden operations, depending on location, soils, and local enthusiasm for the idea. It is

recommended that a site specific feasibility study is performed before any steps towards establishing a garden are made. This feasibility study should, at least, include the selection of the actual site, a cropping programme, a business plan, local market research, and a investigation of the aspirations of the people and the community involved.

APPENDIX

Budget cost estimates for a three acre market garden.

Assumptions

- size three acres
- availability of water for irrigation
- land free of cost
- money to set up garden borrowed at 13.5% annually and amortized over 5 years (semi-annually compounded).
- operating capital borrowed at 13.5% for 1 year.
- no mulching or tunnelling

Summary of Cost of Production of a Three Acre Market Garden

Fertilizer	$ 192.85
Chemicals	$ 51.00
Seed	$ 453.60
Machinery/Other Equipment	$10,550.00
Greenhouse	$ 800.00
Labour	$ 5,646.00
Storage Building	$ 1,050.00
Marketing Costs	$ 500.00
Operating Cost	$ 425.00
Long Term Financing Cost	$ 3,487.08
Operating Capital Financing	$ 500.00
Depreciation	$ 980.00

see also table 3 on page 15.

Fertilization

Estimates are based on the recommendations for each crop in the Alberta Vegetable Production Guide. Actual rates are dependent on the needs of each particular plot as determined by soil testing.

Crop	Type of Application	Type of Fertilizer	Recommended Rate kg/acre	Average of crop	Total Weight (in kg)
Cabbage	b	11-55-0	70	.5	35
	b	34-0-0	45		22.5
	a	34-0-0	45		22.5
Cauliflower		same as cabbage		.3	21
					13.5
					13.5

Crop	Type of Application	Type of Fertilizer	Recommended Rate kg/acre	Average of crop	Total Weight (in kg)
Broccoli		same as cabbage		.3	21
					13.5
					13.5
Peas	b	11-55-0	35	.3	10.5
	b	34-0-0	50		15
	a	11-55-0	30		10.5
Carrots	b	11-55-0	100	.3	33
	b	34-0-0	90		30
	a	34-0-0	15		4.5
Onion	b	11-55-0	20	.3	.6
	a	34-0-0	35		11.5
Potatoes	b	11-55-0	120	1	120
	b	34-0-0	140		140

a: application during growing season
b: broadcast application prior to seeding

total fertilizer requirement:
11-55-0: 257 kg or 11 bag 25 kg
34-0-0: 300 kg or 12 bag of 25 kg

Price per March 1, 1985 (Source: Alberta Wheat Pool)
11-55-0: $422/metric tonne or 10.55/bag
34-0-0: $256/metric tonne or 6.40/bag

Total fertilizer cost: $192.85

Chemicals

Weed control
Reliance on hoeing and black mulch for weed control

Insect control
Dependent on insect infestation

Method of calculation: inflate the findings of the cost of production study of 1979 by the C.P.I. It is recognized that this is a very inaccurate method but it should be taken into account that chemicals do not constitute a major cost for a market garden (less than 1% of total cost) operation so that inaccuracy in this category does not unduly influence the total costing procedure.

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Seed

Cabbage	120 grams will produce enough transplants to plant 1 acre of cabbage. Thus, total cabbage seed requirement is 60 grams.	
	1 x 20 gram package of Early Marvel (early variety)	$ 3.40
	1 x 20 gram package of Storage Green (late storage variety)	$ 6.30
Cauliflower	120 grams will produce enough transplants to plant 1 acre of cauliflower. Thus, total cauliflower seed requirement is 40 grams.	
	2 x 20 gram package of White Rock at 20.70	$ 41.40
Broccoli	120 grams of seed will produce enough transplants to plant 1 acre of broccoli. Thus, total broccoli seed requirement is 40 grams	
	2 x 20 gram package of Premium Crop at 14.50	$ 30.80
Carrots	1.5 kg of seed required to seed 1 acre of carrots, thus, total carrot seed requirements is 450 grams of carrot seeds	
	1 x 454 grams of Touchon Deluxe at 22.80	$ 22.80
Onion	Full seeded with a density of 4.25 kg/acre giving a total seed requirement of 375 grams	
	3 packages of 113 gram = 339 gram of Norstar at 38.20	
	2 packages of 28 grams = 56 gram of Norstar at 10.40	$ 48.60
Peas	30 kg/acre of seed is needed if row cropped, resulting in a total seed requirement of 10 kg	
	10 kg of Green Arrow at $3.63/kg	$ 36.30
Potatoes	one acre of potatoes planted with 90 cm between the row and 30 cm between seed pieces (using 55 gram seed pieces) requires 800 kg of seed potatoes (netted gems) at $.33/kg	$264.00

Total seed requirements: $453.60

Source: for seeds: 1985 Catalogue of Stokes Seed Ltd.
for potatoes: Edmonton Potato Growers (1971) Ltd.

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Machinery and other equipment

- Backpack sprayers (2) @ $125	$ 250
- Small garden tools	$ 300
- Precision seeder	$ 1,000
- Rototiller, heavy duty	$ 800
- Fertilizer spreader, push type	$ 200
- Irrigation*	$ 3,000
Total	$10,550

*Irrigation

type of system: drip irrigation, ie. high grade plastic tubing delivering the water to the plant on ground level

advantage: low pressure system needs less pumping power delivers water to the plant -- no waste of water (100 feet of tubing at 10 psi only need 1 gallon/hour)

disadvantage: tubing lies on top of the soil along the row of crops, thus only hand cultivation between plants.

Equipment needed:

- one fully rigged pump of no more than one (1) h.p.	$ 700
- tubing to deliver water to plants (6500 running feet)	$7300

Water requirements:
Monotubing will need 600 gallons/hour

Sources: Hausher (1985)
Green Thumb Irrigation Ltd.

Greenhouse

It is assumed that several of the crops are started early and transplanted into the garden. For this purpose, and for this purpose alone, a small greenhouse is included in this budget estimate. The greenhouse will be in use from late winter/early spring till planting time.

Pre-packaged greenhouses can be had for as little as $400. The estimated total cost for a small greenhouse plus a woodstove for heating is estimated at $800.

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Labour Requirement

	hours/acre	hours/3 acres
Pre-season	10.8	32.4
Planting	20.25	60.75
Summer	116.00	348.00
Harvest	175.00	525.00
Total	322.05	966.15

Source: calculated from Alberta Market Garden Cost of Production study (1979)

The above mentioned total hours translate to a personnel requirement of:
1 manager May-September
1 helper for planting in May
5 helpers for harvesting in September

If we assume a labour cost of $6/hour for the manager and $4.50 for helpers, we find:

Manager	522.5 hours	@ $6.00	$3135
Helpers	430 hours	@ $4.50	$1935

An additional requirement is the need to man a gate side stand to sell the produce. It is estimated that the stand will have to be manned for eight hours during 8 weekends. During the week one of the harvest helpers or the manager can keep an eye on the stand.

Salesperson	128 hours	@ $4.50	$ 576
		Total	$5646

Storage

Although refrigeration will improve the storage life and the quality of the product, the storage requirement is met in this exercise by a well constructed root cellar, ie. well insulated walls and ceiling, concrete floors, subdivided for bins, and a ventilation system.

The following figures are an average of cost figures presented by the Horticultural Centre in Brooks.
Average building cost: $150/tonne
Tonnage of vegetables to be stored: 7 metric tonnes

Total building cost: $1050

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Marketing Cost

In the example operation it is assumed that the sales will be at the gate. Marketing costs are limited to the erection of a stand and some signs, all of which can be erected for less then $300. In addition it is likely that some advertising will be done.

Total marketing cost: $500

Transportation

The assumption of farm gate sales reduces the transportation requirement to the need to bring the inputs to the garden. It is assumed that some vehicle (preferably a half ton truck) is available so that only some operating cost are included. See operating cost.

Operating Costs

- Gas and maintenance for rototiller, irrigation pump, truck and miscellaneous items is estimated at: $ 300.

- Black mulch to cover one acre:
  6000 feet @ 41.04/2000 feet: $ 125

  Total costs estimated at: $ 425

Financial Considerations

*	Total Machinery Cost	$10,550
	Storage Building	$ 1,050
	Gate Stall	$ 300
	Greenhouse	$ 800
	Total long term capital expenditure	$12,700

If a payback period of 5 years is assumed and an interest rate of 13.5% compounded semi-annually, the monthly payment will be $289.84.

* Depreciation of machinery is limited to the irrigation system, rototiller, and precision seeder, all to to be depreciated over 10 years.

Total value:	$9800
Depreciation period:	10 years
Annual depreciation:	$ 980

* Total short term capital required to cover the operating expenses, including debt servicing is $7750.29. Not all expenses come early in the season; money for labour, for example, is mainly needed in the harvest season. Wat is needed is a line of credit large enough to cover all expenses as the come up. The cost of this line of credit is estimated at $500.

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